

New Species of *Meconopsis* (Papaveraceae) from Mianning, Southwestern Sichuan, China^{*}

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Abstract: Two new species of *Meconopsis*, *M. pulchella* and *M. heterandra* are described and characterized. Differences with similar species are discussed and photos showing the diagnostic features are provided.

Key words: *Meconopsis*; *M. pulchella*; *M. heterandra*; New species; Sichuan

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In *Acta Botanica Yunnanica* 29 (3) we (Yoshida *et al.*, 2007) reported the rediscovery of *Meconopsis wilsonii* C. Grey-Wilson subsp. *wilsonii* in Mianning Xian, Sichuan Province, in the summer of 2005, nearly 100 years after it was first encountered. Additional research in the Mianning region in 2009 focusing on *Meconopsis* revealed two new species for the genus, *M. pulchella* and *M. heterandra*, as described below. The two species grow sympatrically on a southwest facing alpine slope on an iron-rich mountain. Further exploration in the surrounding area is needed to determine their full range of distribution. Herbarium specimens are often not sufficient for determining diagnostic features, for example, the number and color of the petals in *Meconopsis pulchella*, which are quick to fade and are soon deciduous. The shape of the inflated filaments in *M. heterandra* can be difficult to determine, since they are easily removed and tend to shrivel in dried specimens.

Meconopsis pulchella T. Yoshida, H. Sun & D. E. Boufford, sp. nov.

Type: China, Sichuan Province: N of Lamagetou Village, Yele Xiang, Mianning Xian, 4 150-

4 300 m, 4 August 2009, T. Yoshida K21 (Holotype: KUN; isotype KUN). (Fig. 1: A—D)

Diagnosis: *Meconopsis impeditae* Prain affinis sed floribus seminutantibus, petalis quaternis magenteis et his basibus ascendentibus, atque foliis semper integris differt.

Meconopsis pulchella is related to *M. impedita* Prain (Wu *et al.*, 1999) but differs from the latter in the half nodding flower posture (nodding downward in the latter), in petal number (4, usually 5-9 in the latter), color (magenta or reddish purple, not bluish purple as in the latter), and base of petals ascending (not spreading as in the latter), and also in the entire leaves (often lobed in the latter).

Description: Plants monocarpic. Taproot fusiform, elongate, 4-10 cm long or more, 4-6 mm across near ground level. Stem nearly absent. Entire plant covered with straw colored bristles; bristles 2-6 mm long, base sometimes thick and blackish. Leaves all basal; petiole linear, 2-5 cm long, 1-1.5 mm wide; lamina oblong-lanceolate, rarely ovate, 1.5-6 cm long, 7-10 mm wide, base attenuate or rarely rounded, margin entire, sometimes repand, apex acuminate.

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nate, acute or obtuse, both surface covered with bristles, lower surface whitish in dried specimens. Inflorescence basal, with 3-6 scapes per individual; scapes 4-18 cm long, 1-1.5 mm across at flowering, to 25 cm long or more, 2 mm across at fruiting, densely covered with patent or somewhat retrorse bristles, bristles most dense at expanded apex of scapes. Flowers 1 per

scape, bowl shaped, 2.5-5 cm across, half nodding; calyx 8-12 mm long, green; petals 4, rarely 5 or 6, magenta or reddish purple, obovate or broadly obovate, 1.7-3 cm long, apex rounded or obtuse; stamens numerous, filaments filiform or linear, 5-7 mm long, to 0.3 mm wide, similar to or darker than petals in color, anthers rounded, 1 mm long, thecae pale



Fig. 1 *Meconopsis puchella*

A. Flowering plant; B. Fruiting; C. Type specimen with flowers; D. Type specimen with fruits

rusty brown; ovary ellipsoid, 5–7 mm long; style 2–3 mm long; stigma 1–2 mm long, divided into 3 or 4 ovate lobes. Fruiting capsules obovoid-oblong, 2–2.5 cm long, 5–8 mm across, densely covered with bristles, with 3 or 4 longitudinal ribs.

Distribution: China, Sichuan, Mianning Xian, only in the vicinity of the type locality: 29°00'05" N, 102°11'03" E, 4 150–4 300 m, in the northern portion of the Yele (Lamagetou) Nature Reserve.

Habitat: Rooting deeply among rocks and in humus above rocks on southwest facing stony alpine slope of a metaliferous mountain where iron ore is mined from several pits around the habitat of *Meconopsis pulchella*.

Specimens examined: T. Yoshida K21 (KUN)

Note: *Meconopsis impedita* is generally larger than *M. pulchella* in stature, leaves, flowers and fruits, and number of scapes. The scapes of *M. impedita* elongate characteristically in fruit to more than twice their flowering length, but less than twice their length in *M. pulchella*. The scapes usually bend in all directions from the base in *M. impedita*, but remain erect in *M. pulchella*. *Meconopsis impedita* has entire to pinnately and irregularly lobed leaves, the shape of which varies greatly within a colony or even on a single plant; moreover, there are always some plants with lobed leaves in every colony as far as we have observed in northwestern Yunnan and adjacent Tibet. *Meconopsis pulchella*, however, always has entire

or repand, never lobed, leaves. The bristles of *M. impedita* are somewhat fewer, shorter and weaker than those of *M. pulchella*, without a thick and blackish base as in the latter.

The scapes of *M. impedita* bend abruptly at a few centimeter below the flowers, resulting in nodding flowers. The scapes of *M. pulchella* are erect, therefore the flowers are only partially nodding. The flowers of *M. impedita* open in the shape of a pan with the base of the petals spreading, whereas those of *M. pulchella* are bowl shaped with the base of the petals ascending. *M. impedita* has 5 to 9 petals, whereas *M. pulchella* has 4 (rarely 5 or 6) petals per flower. The petals of *M. impedita* are usually bluish purple, rarely tinged with red to appear reddish purple in some plants within a colony. The reddish petals in *M. impedita*, however, are exceptional and never stable nor dominant throughout a colony as in *M. pulchella*. The anthers (thecae) are orange in *M. impedita*, but pale rusty brown in *M. pulchella*.

Meconopsis heterandra T. Yoshida, H. Sun & D. E. Boufford, sp. nov.

Type: China, Sichuan Province; N of Lamagetou Village, Yele Xiang, Mianning Xian, 4 200–4 450 m, 4 August 2009, T. Yoshida K22 (Holotype: KUN; isotype: KUN). (Fig. 2: A–D)

Diagnosis: *Meconopsis rudi* (Prain) Prain et *M. racemosae* Maxim. affinis sed adaxialis filamentis inflatus et intro curvis differt.

Table 1 Comparison of major features separating *Meconopsis pulchella* and *M. impedita*

	<i>Meconopsis pulchella</i>	<i>Meconopsis impedita</i>
Scape length	Elongating in fruit to less than 2 times flowering length	Elongating in fruit to more than 2 times flowering length
Scape posture	Erect	Bent at base
Flower posture	Half-nodding	Nodding downward
Leaves	Entire or repand	Entire, pinnate, or irregularly lobed; variable even within an individual
Bristles	More, longer, stronger	Fewer, shorter, weaker
Petal number	4 (rarely 5 or 6)	Usually 5–9
Petal color	Magenta or reddish purple	Bluish purple, rarely tinged with red
Anther color	Pale rusty brown	Orange

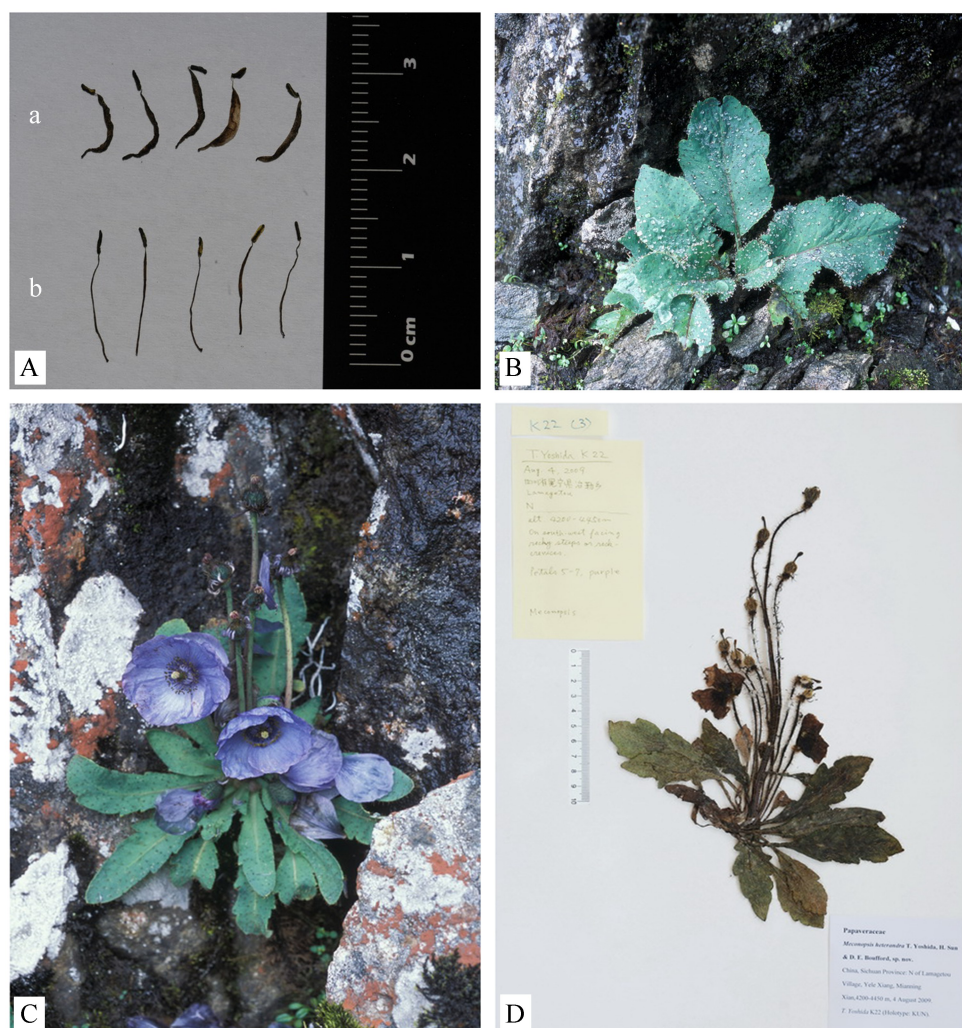


Fig. 2 *Meconopsis heterandra* A. Stamens; a. Inner stamens; b. Outer stamens; B. Young plant; C. Flowers; D. Type specimen with fruits and flowers

Meconopsis heterandra is similar to *Meconopsis rudis* (Prain) Prain (1906) and *M. racemosa* Maxim., but differs from them in its inflated and inwardly curved inner filaments.

Description: Plants monocarpic, 12-20 cm tall at flowering, to 25 cm tall at fruiting. Tap-root elongate, 8-20 cm long or more, 4-8 mm across near ground level, sometimes forking distally. Entire plant covered with patent spine-like hairs; spine-like hairs pale brown or dark purple, to 7 mm long, rather weak, base sometimes thick and blackish. Stem short, 2-4 mm across at ground level, to 5 mm across in fruit. Leaves crowded near base of stem, petiole broadly linear, 2-6 cm long, 2-4 mm wide, lam-

ina rhombic-elliptic to oblanceolate, 4-10 cm long, 1.5-3.5 cm wide, base attenuate or cuneate, margin coarsely serrate with 2-4 pairs of teeth, otherwise sinuate or entire, apex acute, obtuse, or rounded, both surfaces glaucous and covered with patent spine-like hairs. Inflorescence racemose, with short rachis; few lowest flowers subtended by leaf-like bracts. Flowers 8-12 per individual, half nodding, 3-7 cm across; pedicels ascending, 5-12 cm long, to 15 cm long in fruit, abruptly swollen to 4-6 mm across at base of calyx; calyx 10-15 mm long; petals 5-7, blue or pale purple, obovate, broadly obovate or rounded, 2-3.5 cm long; stamens numerous, filaments 7-10 mm long, similar to petals in col-

or or occasionally tinged with pink, dimorphic; inner filaments inflated and curved inward, 0.5–1 mm across, thus covering ovary, outer filaments filiform or narrowly linear, straight; anthers 1–1.5 mm long, thecae orange or dark purple; ovary globose to ovoid, 5–7 mm long, densely covered with ascending spine-like hairs; style 2–3 mm long, to 5 mm long in fruit; stigma divided into 4–7 lobes, lobes strap shaped, 3–6 mm long. Fruiting capsules globose to ellipsoid, 1–1.5 cm long, densely covered with spine-like hairs.

Distribution: China, Sichuan, Mianning Xian, only in the vicinity of the type locality, 29°00'13" N, 102°11'19" E, 4 200–4 450 m, in the northern portion of the Yele (Lamagetou) Nature Reserve.

Plants on Balang Shan, Siguniang Shan and Jiajin Shan in Xiaojin Xian, north of the type locality in the same province, and identified as *M. racemosa* or *M. rudis* in the past are presumed to be more or less variants, or hybrids, of *Meconopsis heterandra*. Those plants have mostly entire leaves and appear to have fewer inflated filaments than the plants at the type locality. The plants on Jiajin Shan, a metaliferous mountain, have curious dark purple petals. Further field research in and around that area, and good quality specimens, especially to show the stamens, are necessary before the identity and distribution of those plants can be settled. No other plants of *Meconopsis* with such remarkable inflated filaments have been observed in Muli

Xian, the southern vicinity of Mianning, nor in Yunnan Province.

Habitat: Deeply rooted among rocks and in rock fissures on steep, southwest facing slopes exposed to moist currents in summer on a metaliferous mountain in the vicinity of several pits where iron ore is mined.

Specimens examined: T. Yoshida K22 (KUN)

Note: The inflated, air filled, inner filaments that curve inward to wrap around the ovary are diagnostic for *Meconopsis heterandra* and quite unique not only among similar species, but within the genus. The filaments in *M. henrici* Bureau & Franch. are somewhat similar, but are uniformly dilated (not inflated) in the basal half. Inflated filaments in *M. heterandra* may offer some degree of protection to the developing ovary. *Meconopsis discigera* Prain of the eastern Himalaya grows in similar habitats and also covers the ovary, although not with the stamens, but with the expanded base of the style.

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References:

- Prain D, 1906. A Review of the genera *Meconopsis* and *Cathcartia* [J]. *Annals of Botany*, **20**: 323–370
- Wu CY (吴征镒), Chuang H (庄璇), Su Z (苏志云), 1999. Papaveraceae, Flora of China [M]. Beijing: Science Press, **32**: 47
- Yoshida T, Sun H, Boufford DE, 2007. *Meconopsis wilsonii* subsp. *wilsonii* (Papaveraceae) rediscovered [J]. *Acta Botanica Yunnanica* (云南植物研究), **29** (3): 286–288